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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER

ART UNIT	PAPER NUMBER
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DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/376,063

Applicant(s)

Seigi

Examiner

Michael Datskovsky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Jun 5, 2001
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 20, 22, and 24-29 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 20, 22, and 24-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) All b) Some* c) None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- | | |
|--|--|
| 15) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 18) <input type="checkbox"/> Interview Summary (PTO 413) Paper No. s/ |
| 16) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 19) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 17) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No. s/ | 20) <input type="checkbox"/> Other |

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DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 20, 22 and 24-25 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 28 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim comprises contradictory requirements: In lines 13-14 it is written that: "...upon application of a heat treatment to the device causing the bumps of the first and second bump units to melt, the bumps of the first bump unit remain apart from each other...". In lines 16-18 it is written: "...wherein the bumps of the first bump unit are sufficiently close to each other that upon the application of the heat treatment to the device, the bumps of the first bump unit fuse into a unitary body".

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Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 20, 22, 24-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barrow in view of Nakamura and Katchmar.

Barrow teaches a semiconductor device, figs. 3-5, comprising: a substrate 12 having a main surface 14 and a back surface 16, wherein said back surface 16 has a central area 38, an intermediate area 42 surrounding said central area 38 and a peripheral area 36 surrounding said intermediate area 42; a semiconductor chip 18 formed on said main surface; a first bump unit formed of solder and located in said central area of said back surface, wherein said first bump unit radiates heat from said semiconductor device (abstract, lines 12-15); a second bump unit formed of solder and located in said peripheral area of said back surface, wherein said second bump unit transmits signals (col.3, lines 6-7), wherein the second bump unit is greater in quantity of solder balls than the first bump unit, and said solder balls are spherical in shape. Barrow does not teach a first distance between signal bumps being greater than a second distance between heat transferring bumps, **said first distance being less than a third distance between the central (heat transferring) area and the peripheral (signal) area; along with a requirement that a distance between solder balls in the first unit (central-heat transferring) being small enough**

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to allow said solder balls to melt and to fuse to each other creating a unitary body.

First: It is inherent to locate signal solder bonds within a distance between each other being big enough to prevent shorting after they are melted during the installation. (See for example reference by Bond et al, US Patent 5,642,261 - fig.2, solder balls 18, cited in previous actions.)

Second: It is also inherent when making a heat transfer path made of solder balls to locate them as close as possible, up to a solid layer of solder, in order to make said heat transfer path more efficient.

Third: Nakamura teaches a way to prevent shorting between a power supply and ground terminal in a ball greed array semiconductor device, figs.1-7, by increasing the distance between solder balls (col.4, lines 10-18). Katchmar teaches a way to create an efficient thermal conductive path in a ball greed array semiconductor device, figs. 1-6, by placing solder balls in closer proximity to each other, figs. 5-6 or by creating a unitary body 26, fig.4 (col.7, lines 35-52). **Base on foregoing** it would have been obvious to one having ordinary skill in the art at the time the invention was made to make a first distance between signal bumps being greater than a second distance between heat transferring bumps **and big enough to prevent a shorting during the installation as it is done by Nakamura,** and to make said second distance between solder balls in the first unit small enough to allow said solder balls to melt and to fuse to each other creating a unitary body as it is shown by Katchmar in the device by Barrow in order to

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enhance the dissipation of a heat. It would have been also obvious to one having ordinary skill in the art at the time the invention was made to make **said first distance (between signal bumps) less than a third distance between the central (heat transferring) area and the peripheral (signal) area** since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing

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date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Datskovsky whose telephone number is (703) 306-4535.



Michael Datskovsky
Examiner

M.D.

June 20, 2001